

HEDGEHOGS OF THE DESERT OF RAJASTHAN

BY

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PART 1. FOSSORIAL HABITS AND DISTRIBUTION

(With four text-figures)

INTRODUCTION

Although the fossorial habits of many insectivores (moles and shrews etc.) have been studied to some extent, those of hedgehogs have not been studied so far. In this country particularly even their distribution has not been satisfactorily studied. Among the earlier workers, Herrick (1892) and Wood (1910) have studied only certain aspects of the fossorial habits of moles. The former has described their digging habits to be 'swimming through the earth'. Wood (1910) remarked: 'the burrows of the moles are always excavated not by bringing dirt to the surface but by pushing it aside.' Later on Hisaw (1923) and recently Reed (1951) have described in detail the method of their digging and shoving of the soil.

Coming to the question of their distribution in this country, Jerdon (1867), Blanford (1888-91), Wroughton (1918), Prater (1948) and Ellerman and Morrison-Scott (1951) have recorded the presence of these animals on a very broad basis. The details are lacking and also these workers have not mentioned anything about the population density of these animals.

This study, therefore, has been attempted in order to collect further information. The distribution was studied last summer (1954) during our tour of the desert. The tour was undertaken under a UNESCO scheme to study the role of vertebrates in spreading and preserving the desert conditions. We are highly grateful to UNESCO for the financial help. Information on distribution was also collected through the officers of the Government of Rajasthan, and those of the Anti-Locust Department (Directorate of Plant Protection, Government of India). The fossorial and feeding habits were studied in Pilani under the patronage of the Birla Education Trust, for which we are thankful to its Secretary, Shri S. D. Pande. We also acknowledge the help given by the Government departments and various organisations and express our gratitude to them and also to those individuals who helped us in various ways from time to time. Our thanks are also due to Shri K. S. Pradhan of the Zoological Survey of India and to its Director for helping us with necessary literature.

TECHNIQUE

Owing to their nocturnal habit, hedgehogs are not easily collected during the day time. They are generally found in the evenings under

hedges. In a village or outside a town they are often seen under lamp posts, where they come to feed upon insects and toads. During the day they have to be dug out of their burrows. For the present study they were kept in captivity and also in semi-captivity. For the former condition they were kept in large cages (90" $\times$ 30" $\times$ 30") with a thick layer of sand at their bottom; for the latter they were left in a closed courtyard (15' $\times$ 20'). For the study of the burrow its roof was removed and the burrow was covered with a glass pane. After this change, too, the hedgehogs continued to use the tunnel.

DISTRIBUTION

According to our collections and the reports received, there are two species of hedgehogs found in this region: 1. *Hemiechinus auritus collaris* Gray 2. *Paraechinus micropus micropus* Blyth. The former is spread all over the desert. It is less abundant in the northern and western regions

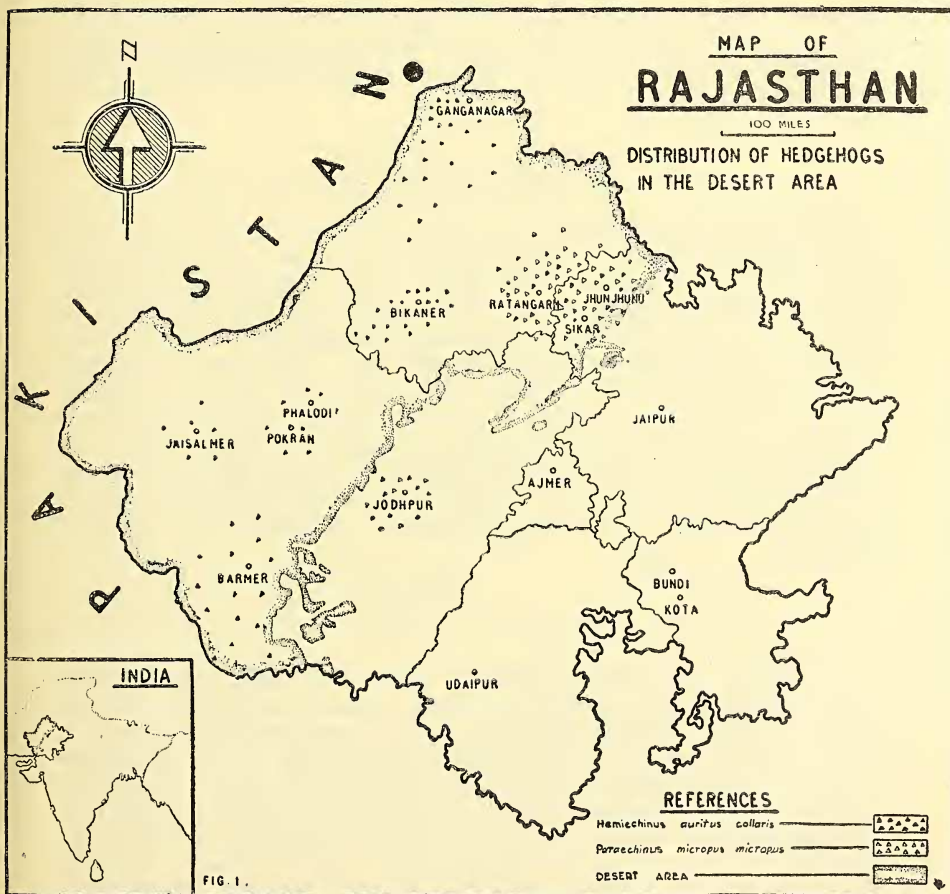


FIG. 1

(Ganganagar, Bap, Phalodi, Jaisalmer and Barmer) than in the southern and eastern ones (Ratangarh, Jhunjhunu, Bikaner and Jodhpur). *P. m. micropus* is confined to the north-eastern part (Ratangarh and Jhunjhunu), where it is more abundant than even *H. a. collaris*. Our catches have shown that *P. m. micropus* are twice as abundant there as *H. a. collaris*. Here the collection was made at three different places for a fixed period at each one (three days) in the months of August and September. The catches revealed that the sex ratio for both the species in these months was 3 males to 1 female.

Jerdon (1867) and Blanford (1888-91) did not record *P. m. micropus* from Rajasthan, and have mentioned that this variety occurred only in the South India (Trichinopoly and Coimbatore etc.). At that time the sub-species *micropus* and *nudiventris* were not separated and were included under a common name *micropus*, which had a full specific rank. The accounts of Jerdon (1867) and Blanford (1888-91) are correct for the *Paracchinus micropus nudiventris* Horsfield but not for *P. m. micropus*. The other reason for their omission could be that they collected material from Barmer, Jaisalmer and Ganganagar only, where we also have not observed this sub-species. Later Wroughton (1918) has recorded the presence of *P. m. micropus* from this northern part of Rajasthan and has described Bahawalpur as its type locality. The type locality for *H. a. collaris* was not yet spotted out.

GENERAL HABITS

Hedgehogs are nocturnal and during the day they remain inside their burrows rolled up as a ball. They come out at dusk and remain active for about 5 to 6 hours. They retire to their burrows at mid-night. When touched, or sometimes even when approached, they roll up in an impenetrable ball of spines, withdrawing their snout and limbs. After some time they slowly and cautiously open out. When a stick is inserted in their burrow they make a hissing noise. Probably this is an adaptation to mimic snakes which are generally regarded to be dangerous animals. In captivity also they make a similar noise when they are touched to pick up and also react with an upward jerk as they are touched. When the animal is moving its spines are directed backwards, but as it rolls up they stand erect due to the stretching of *musculus orbicularis*.

FOSSORIAL HABITS

Hedgehogs spend most of their life under the ground. They inhabit small burrows dug by themselves. These burrows are invariably found under a hedge or a dense bush, but never in open ground and in loose soil. These subterranean homes follow a fixed plan. They are simple straight pouches in the earth with only one opening. Their inner blind ends are slightly dilated and there is no 'bolt run' (Fig. 2). The burrows are usually 1 to 1½ ft. long but in Bikaner, where the soil is looser than in Jhunjhunu, 4 to 5 ft. long burrows have also been observed. Ordinarily only one individual lives in a burrow, except in the breeding season when the female lives with her offspring till such time as they are

old enough to dig their own burrow. To accommodate the young, the female widens the blind (distal) end of the burrow (Fig. 3). In semi-captivity *P. m. micropus* made an abnormal burrow in which three individuals used to live (Fig. 4). The following are the dimensions of the burrows :—

Length	...	12" to 24"
Diameter of opening	...	2.5" to 4"
Diameter of distal dilated end...	...	3.5" to 5"
Diameter of the distal blind end of burrow of female hedgehog in breeding season	...	4.5" to 7"
Depth	...	8" to 14"

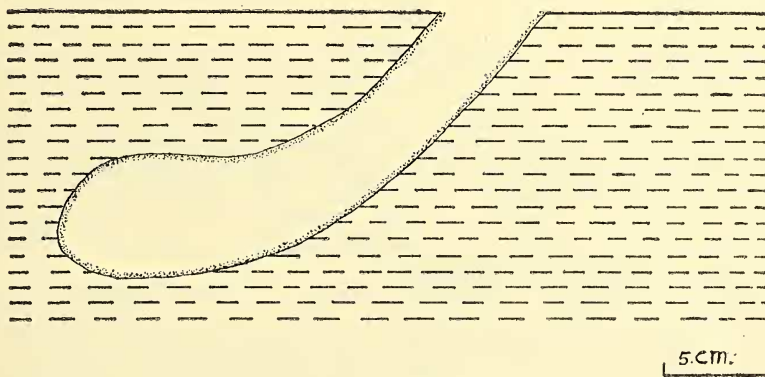


FIG. 2

Burrow of hedgehog. Common in nature. Vertical Section.

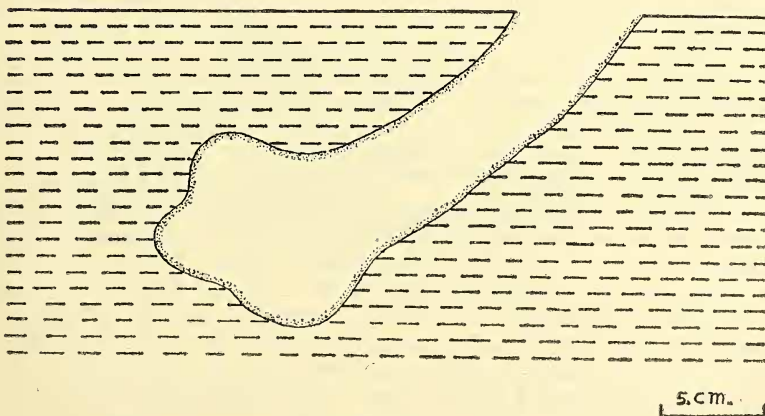


FIG. 3

Burrow of female hedgehog in breeding season. Vertical section.

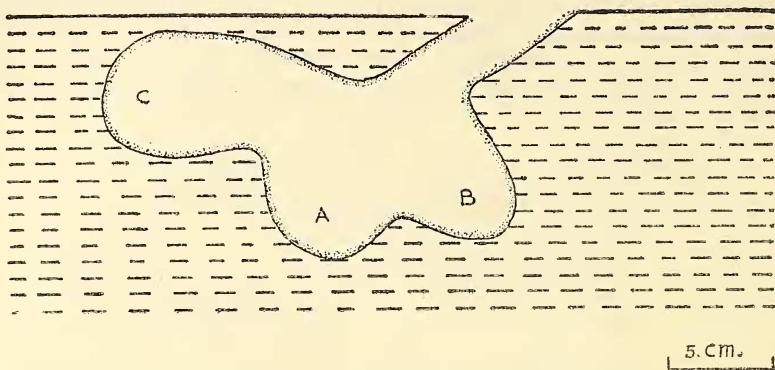


FIG. 4

Abnormal burrow of hedgehogs, dug by three *Paraechinus micropus micropus*. A was dug first, then B and C were dug by two other individuals. Vertical Section.

Hedgehogs enter their burrow head first and while doing so they project the anterior portion of the *musculus orbicularis* over the snout to protect it from any injury. The animal lies in the burrow in two positions: 1. Half rolled up, 2. fully stretched. In its return journey also, the snout comes first. The turning inside the narrow burrow is done by pressing the body sideways.

During the process of digging, hedgehogs loosen the earth by lateral strokes of the fore-limbs, which are armed with broad spade-like claws. These strokes are so powerful that the sand is thrown to a considerable distance behind the body. Shoving of dirt is thus achieved by the powerful strokes of the fore-limbs till the burrow is 6" to 7" long. Thereafter, when the burrow reaches a length of about a foot, the hedgehog backs up to the middle of the burrow in 'reverse gear' and kicks the sand out by the rapid alternate action of the hind-limbs. A small hill of sand is formed at the opening of the burrow. The hedgehog now comes to the opening by moving in reverse and shoves away the hill also, again with its hind-limbs. In semi-captivity *P. m. micropus* were not observed to dig their own burrows. They always preferred to remain under logs and dense branches of bushes. Sometimes they chose the burrows dug and vacated by *H. a. collaris*. In nature, however, the *P. m. micropus* were always found in burrows. *H. a. collaris*, on the contrary, always dug their burrows themselves. When the earth is sufficiently hard they usually complete digging their 12" to 15" long burrow in 3 to 4 hours.

The method of digging of these animals is similar to that of the moles, *Scalopus aquaticus machrinoides* (Hisaw, 1923), *Scapanus latimanus latimanus* (Reed, 1951) and *Neurotrichus* (Reed, 1951). No other insectivore has been recorded by naturalists to shovel like these animals. The talpine mole, *Scapanus latimanus latimanus* shoves the earth by 'using one outthrust hand as a pusher, with the neck and thorax bent to one side and locomotion achieved by use of the other three limbs; this same posture is maintained when pushing dirt out onto the surface. Under such conditions the hind-limbs would be performing the major part of locomotor effort' (Reed, 1951). About the shoving by *Neurotrichus*, Reed (1951) states: 'It does not however, bring dirt to

the surface to form mole hills, nor does it seem to transport dirt through a burrow as will a true mole; presumably it always excavates in such soft earth that a burrow can readily be constructed by pressing the dirt aside.'

Cuvier (1817) wrote that there is a special bone in the nose of the mole, *Talpa europea*, which the animal uses for digging. But Reed's remarks are to the contrary. He writes: 'I can only say that there is no special 'digging' bone in the nose of *Scapanus latimanus* and *Neurotrichus gibbsii*, and I doubt if any other mole has one.' Other observers have also not recorded the presence of the special bone which Cuvier (1817) mentioned (J. G. Wood, 1859; Herrick, 1892; Stephens, 1906; Slonaker, 1920).

Skulls of these hedgehogs were also examined, and no such special bone has been observed. Moreover, the hedgehogs have never been observed using their snouts for digging purposes.

SUMMARY

1. Fossorial habits of two species of hedgehogs found in the desert of Rajasthan are described; also their method of tunnelling.

2. The distribution of *Hemiechinus auritus collaris* Gray and *Paraechinus micropus micropus* Blyth in the desert of Rajasthan is given.

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